Small Business Innovation Research/Small Business Tech Transfer

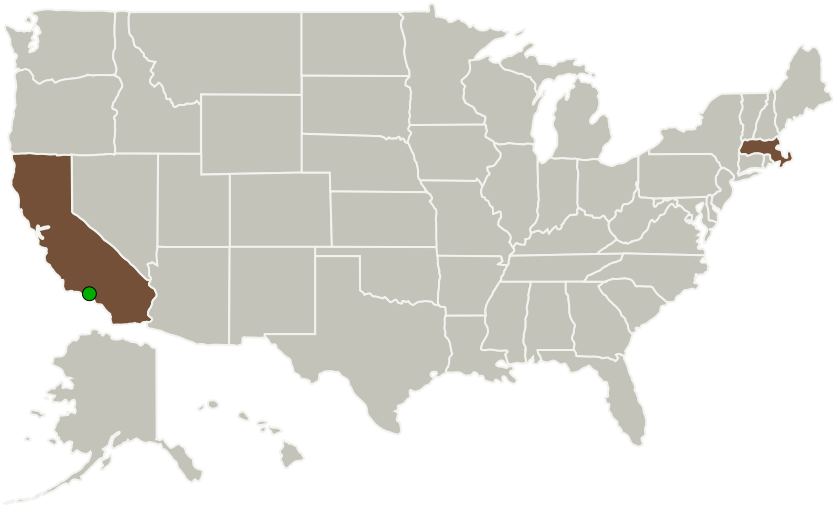
Next-Generation Deformable Mirrors for Astronomical Coronagraphy by Utilizing PMN-PT Single Crystal Stack Actuators in integration with Driver ASIC, Phase I

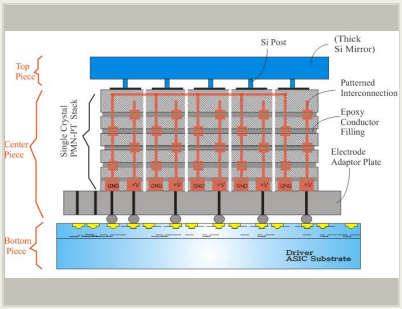
Completed Technology Project (2017 - 2017)

Project Introduction

This SBIR Phase I project aims to develop a new manufacturing approach for deformable mirrors (DMs) by batch fabricating the stack actuator array. The innovation leverages on our experience in developing stack actuator DM system with integrated ASIC driver electronics, enabling the next-generation DM-ASIC systems that are featured with: electro-mechanical performance exceeding traditional piezoelectric DMs by about 5 times, reduced number of wires from thousands to several tens, reduction of the power dissipation by two (2) orders of magnitude, shrinking of the form factor (weight/size) of the DM driver electronics by up to two (2) orders of magnitude, and reducing the DM cost by about 5 times. With both DM and the driver ASIC scalable by mosaicking to 96x96, 128x128 or larger format, the innovation holds promise of filling the NASA Technology Gap on DM and associating driver electronics connectors/cables as listed in the recently released Exoplanet Exploration Program Technology Plan Appendix 2017.

Primary U.S. Work Locations and Key Partners





Next-Generation Deformable Mirrors for Astronomical Coronagraphy by Utilizing PMN-PT Single Crystal Stack Actuators in integration with Driver ASIC, Phase I Briefing Chart Image

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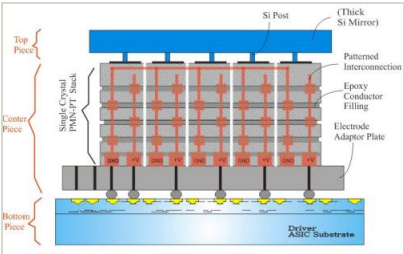
Completed Technology Project (2017 - 2017)

Organizations Performing Work	Role	Type	Location
Microscale, Inc.	Lead Organization	Industry Small Disadvantaged Business (SDB)	Woburn, Massachusetts
Jet Propulsion Laboratory(JPL)	Supporting Organization	NASA Center	Pasadena, California

Primary U.S. Work Locations	
California	Massachusetts

Images



Briefing Chart Image
Next-Generation Deformable Mirrors for Astronomical Coronagraphy by Utilizing PMN-PT Single Crystal Stack Actuators in integration with Driver ASIC, Phase I Briefing Chart Image *(https://techport.nasa.gov/image/127447)*

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Organization:
Microscale, Inc.

Responsible Program:
Small Business Innovation Research/Small Business Tech Transfer

Project Management

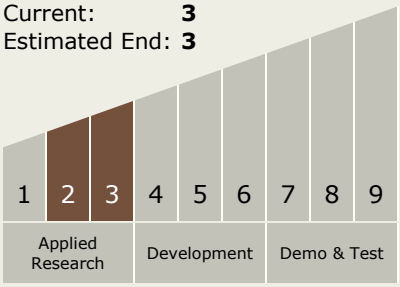
Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
Xingtao Wu

Technology Maturity (TRL)

Start: **2**
Current: **3**
Estimated End: **3**



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Technology Areas

Primary:

- TX08 Sensors and Instruments
  - TX08.1 Remote Sensing Instruments/Sensors
    - TX08.1.3 Optical Components